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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/024,272	12/18/2001	Bernard Delperier	BDL-371XX	4935
207	7590	10/25/2004		
WEINGARTEN, SCHURGIN, GAGNEBIN & LEOVICI LLP TEN POST OFFICE SQUARE BOSTON, MA 02109				
EXAMINER MARKHAM, WESLEY D				
ART UNIT		PAPER NUMBER		
1762				
DATE MAILED: 10/25/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/024,272

Applicant(s)

DELPRIER ET AL.

Examiner

Wesley D Markham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-23 is/are pending in the application.
- 4a) Of the above claim(s) 9-12, 18 and 19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-8, 13-17 and 20-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 8/9/2004, in which the specification of the instant application was amended, Claims 1, 3 – 8, 13 – 16, 20, and 21 were amended, Claim 2 was canceled, Claims 22 and 23 were added, and nine (9) sheets of replacement drawings were submitted. **Claims 1 and 3 – 23** are currently pending in U.S. Application Serial No. 10/024,272 (with Claims 9 – 12, 18, and 19 being withdrawn from consideration pursuant to a restriction requirement), and an Office Action on the merits follows.

Election/Restrictions

2. The applicant's confirmation of the election of Group I, drawn to a method of densifying porous substrates, in the response filed on 8/9/2004 is acknowledged.

Drawings

3. The nine (9) sheets of formal replacement drawings filed by the applicant on 8/9/2004 are acknowledged and approved by the examiner. As such, the objections to the drawings set forth in paragraphs 10 – 14 of the previous Office Action (i.e., the non-final Office Action mailed on 3/16/2004) are withdrawn.

Specification

4. The objections to the specification set forth in paragraph 16 of the previous Office Action are withdrawn in light of the appropriate amendments to the specification and the drawings made by the applicant in the response filed on 8/9/2004.
5. Applicant is reminded of the proper language and format for an abstract of the disclosure. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details. In this case, the abstract does not sufficiently describe the disclosure.

Claim Objections

6. **Claims 1, 22, and 23** are objected to because of the following informalities:
 - Claims 1, 22, and 23: The word, "densified" appears to be misspelled, "densifyied".
 - Claim 23, lines 1 – 2: The phrase, "substrate to be the densifyied in the enclosure" appears to contain typographical errors (e.g., the word "the" is unnecessary and confusing). The applicant is suggested to amend the

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aforementioned phrase to read, "substrate to be densified in the enclosure".

Appropriate correction is required.

Claim Observations

7. Regarding Claims 1, 22, and 23, the examiner has reasonably interpreted the phrase, "the second face" to be equivalent to, "the outside face".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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10. Claims 1, 3 – 8, 13 – 17, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sirtl et al. (USPN 4,194,028) in view of Hammond et al. (USPN 5,911,824), Yamamoto (JP 2000-247779 A), Chaudhuri et al. (USPN 4,741,925), and the applicant's admitted prior art (AAPA) for the reasons set forth in paragraph 24 of the previous Office Action and below.
11. Specifically, in addition to the previously present limitations of **Claims 1, 3 – 8, 13 – 17, 20, and 21** (see paragraph 24 of the previous Office Action for a thorough discussion of such limitations), the combination of Sirtl et al., Hammond et al., Yamamoto, Chaudhuri et al., and the AAPA also teaches the newly added limitations of the aforementioned claims, including (1) the substrates each have an inside volume defined by a concave inside face and have an outside face (see crucible "5" in the Figure of Sirtl et al.; reference numbers "S'₁" and "S'₂" in "Prior Art" Figure 11 of the AAPA); and (2) the reactive gas is admitted into the enclosure through a gas inlet opening into the enclosure at one end thereof and caused to flow through the enclosure between the reactive gas inlet and an effluent gas outlet at another end of the enclosure (see Figure, gas inlet opening "8" at one end of the reactor, gas outlet "9" at the other end of the reactor, and Col.4, lines 10 – 61 of Sirtl et al.; and the gas flowing from inlet "12" at one end of the enclosure to outlet "14" at the other end of the enclosure in Figure 11 of the AAPA). Further, the aforementioned combination of references also teaches the newly added limitation of, "dividing at least a portion of the reactive gas flow entering the enclosure into first and second non-zero fractions, wherein the first fraction of the reactive gas flow is fed to the inside face of the at

least one substrate and the second fraction of the reactive gas flow is fed to the second face of the at least one substrate...". Specifically, Sirtl et al. (Col.4, lines 50 – 54) and Chaudhuri et al. (Col.1, lines 22 – 55) teach that the gas is introduced into the hollow crucible and toward its bottom and inside walls through a plurality of spaced apart holes around the periphery of a gas introduction pipe / tube. As such, the reactive gas flow entering the enclosure is divided into first and second non-zero fractions (i.e., each fraction being the portion of gas that passes through each hole in the gas introduction pipe / tube). By supporting the crucible(s) (i.e., hollow substrate(s)) in the manner suggested by the AAPA (see paragraph 24 of the previous Office Action), all fractions (i.e., both first and second non-zero fractions) of the reactive gas would be fed to the inside face of the substrate(s) and flow by (i.e., be fed to) the outside faces of the substrate(s) during the gas flow path from inlet to the outlet of the enclosure. This gas flow path reasonably suggested by the prior art meets the limitation that, "the first fraction (e.g., both/all fractions) of the reactive gas flow is fed to the inside face of the at least one substrate and the second fraction (e.g., both/all fractions) of the reactive gas flow is fed to the outside face of the at least one substrate", as claimed by the applicant. Please note that Claims 1, 3 – 8, 13 – 17, 20, and 21 do not require that only the first fraction (and not the second fraction) be fed to the inside face of the substrate(s) and only the second fraction (and not the first fraction) be fed to the outside face of the substrate(s).

12. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christin et al. (USPN 5,904,957) in view of either the AAPA or Yamamoto (JP 2000-247779 A).
13. Regarding newly added **Claims 22 and 23**, Christin et al. teaches a method of densifying a porous substrate by chemical vapor infiltration (CVI) (Abstract), the method comprising placing the substrate "2" to be densified in an enclosure "1", admitting a reactive gas into the enclosure through a gas inlet opening "6" into the enclosure, causing the gas to flow through the enclosure between the gas inlet and an effluent gas outlet "7", directing a first, non-zero portion, but not all, of the reactive gas flowing through the enclosure into the interior volume of the substrate(s) (see the gas flow passing through the annular substrate stacks in Figure 1), and feeding a second, non-zero portion of the reactive gas flowing through the enclosure to the outer face of the substrate(s) (see the gas flow passing around the outside of the substrate stacks in Figure 1) (Abstract, Figure 1, Col.1, lines 16 – 65, Col.2, lines 21 – 33, Col.3, lines 10 – 15 and 53 – 58, Col.4, lines 64 – 67, and Col.5, lines 1 – 44), wherein the method further comprises placing at least one other substrate in the enclosure, directing a non-zero portion, but not all, of the reactive gas flowing through the enclosure into the interior volume of the other substrate, and feeding a second non-zero portion of the reactive gas flowing through the enclosure to the outer face of the other substrate (see the two different stacks of substrates shown in Figure 1, each of which has a portion, but not all, of the reactive gas flowing through the interior of the stacks, and a second portion, but not all, of the gas flowing around

the outside of the stacks). Christin et al. does not explicitly teach that the substrate has a hollow shape (i.e., has a concave inside face, an outside face, and an inside volume defined by the concave inside face). Specifically, the substrate(s) explicitly taught by Christin et al. are annular (Abstract, Col.1, lines 64 – 67), not “hollow” as defined by the applicant. However, both the AAPA (see “Prior Art” Figure 11) and Yamamoto (see Abstract and paragraphs [0001] – [0003], [0010], [0012], [0013], [0016], and [0020] – [0024]) teach that, in some cases, it is desirable to densify a substrate having a hollow shape (i.e., having a concave inside face, an outside face, and an inside volume defined by the concave inside face), such as a crucible, by using CVI (i.e., the method taught by Christin et al.). Therefore, it would have been obvious to one of ordinary skill in the art to utilize the CVI method and apparatus taught by Christin et al. (i.e., by feeding a portion of the reactive gas to the inside faces of the substrate(s) and another portion to the outside faces of the substrate(s) in order to densify the substrate(s)) to treat hollow substrates instead of annular substrates, as taught by the AAPA and Yamamoto, with the reasonable expectation of successfully and advantageously sealing the porosity in the substrate(s), thereby allowing the hollow substrate(s) to have excellent endurance (which, of course, would be desirable in the art of crucible manufacture, as taught by Yamamoto), by using a CVI process that is well-known in the art. The aforementioned combination of references does not explicitly teach that the concave inside face of the substrate(s) is/are swept in full by the first portion of the reactive gas flow. However, by replacing the annular substrates with hollow substrates in the process / apparatus

of Figure 1 of Christin et al. (as would have been obvious for the reasons set forth above), the first portion of the reactive gas flow would have inherently swept the full concave inside face of the substrate(s) due to the nature of the gas flow (i.e., due to the gas flowing up and into the concave inside face). In the alternative, since it is the object of both the AAPA and Yamamoto to densify the hollow substrate(s) in general, and no mention or suggestion is made that one portion of the substrate(s) should be densified to a greater degree than another portion, it would have been obvious to one of ordinary skill in the art to feed the first portion of the gas so that such portion sweeps the entire inside face of the hollow substrate(s) with the reasonable expectation of insuring that the entire inside face of the substrate(s) is treated uniformly by the CVI. This position is supported by the teaching in Christin et al. that a "similar gas" should be presented to all of the substrates during the CVI process (Col.2, lines 21 – 24).

Response to Arguments

14. Applicant's arguments filed on 8/9/2004 have been fully considered but they are not persuasive. Specifically, the applicant's arguments are moot in view of the new grounds of rejection (and associated explanation) set forth above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Daws et al. (USPN 6,669,988 B2) teaches a CVI process in

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which a gas is passed both on the inside and on the outside of a number of stacks of substrates.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

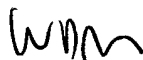
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
Art Unit 1762



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